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The Innovation Struggle: Panel Based Living Labs to the rescue?

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Abstract: Nowadays, developing new and innovative products and services is critical for the survival of companies. Despite that research indicates that user input increases the chances of innovation success, a lot of this potential remains untapped. Most of the research methods that are currently used have certain limitations. The Living Lab-approach provides a valuable alternative to the current approaches, allowing for a tailored integration of user feedback into the NPD-process. However, this flexibility is both one of the main strengths as well as one of the main weaknesses as there is still no definite agreement about the precise definition of this approach. In this paper a panel based approach is applied on four case studies in the music and television industry to overcome

some of these discussion points. These findings are discussed together with the best practices for this type of research.

Keywords: Living Lab; Living lab research, Panel based approach, Research methods, Open innovation, Case studies

1 Introduction

Users have been involved in the design process for several decades. During recent years it has become increasingly easy to collect user feedback (e.g. popularity internet, mobile devices). One of the main advantages is that this feedback can increase user adoption and provide a different perspective to the engineers (Pallot & Pawar, 2012). Furthermore it is possible to use user feedback during the different phases of the new product development process, from idea to product (Schuurman, De Moor, De Marez, & Evens, 2010). Despite this increasing interest in user-centered design it remains difficult to implement this research approach in the new product development process. Next to practical considerations, it is also difficult to translate the findings to actionable results (Mulvenna & Martin, 2013). Researchers are examining the value of new approaches. It is clear that each of the classic approaches (eg. survey, interviews) has its own limitation since an iterative research process requires in depth knowledge. Living Labs try to overcome these challenges by combining different research methods in one research project. Furthermore all the involved stakeholders can be involved in this iterative research process. In that way it should be possible to iterate more often and to achieve product-market fit without spending a lot of resources.

In this paper a panel based approach is proposed to examine if this can add value to Living Labs. People are able to sign up for a panel by completing an intake survey. Based on this survey it is possible to gather in-depth information about their media use and profile the users. It is possible to create a database with different types of users. Based on their intrests, they are involved in certain cases.

This will be illustrated based on four different cases with a clear thematic focus. The goal is to provide the tools that media companies can use to innovate since a lot has happened during recent years in this space so it was hard for these companies to keep up.

For decades, the music industry faced a relatively prosperous future, with technological progress renewing sources of income and securing the long-term viability of the industry. Taking over power from the music publishers at the end of the nineteenth century, new recording techniques created a market that was mainly used to promote the sale of gramophones (Garofalo, 1999). Since the 1960s, however, the recording industry has grown exponentially on the back of technological innovations like the LP. In recent years, as Wikström (2012) argues, ownership-based models have been complemented by access-based models. The changing user behavior has clearly an impact on this industry. The movie and television industry is facing similar challenges.

2 Theoretical framework: Living Labs

It is clear that the development of new products is no longer a linear process. Different steps and iterations are required to come to a final product (Bogers & West, 2011). The first steps are sometimes called 'the fuzzy front end', however even when there is already a concept, it is still possible to change the approach. Sanders & Stappers (2008, p. 3) state in that respect:

"The fuzzy front end is followed by the traditional design process where the resulting ideas for product, service, interface, etc. are developed first into concepts, and then into prototypes that are refined on the basis of the feedback of future users.".

Traditional research methods (e.g. surveys, focus groups, interviews) limit the input of the user to one point in time. This feedback is generated fast but the results are very general. This is clearly suboptimal in an innovation process with a lot of iterations. For a larger research project, this could lead to disintegrated results. It is clear that better alternatives are needed in an iterative innovation process. Longitudinal research, using a traditional research method over a longer period of time, is a first step to deal with this. This can provide insights in aspects like seasonal effects, but it is still limited, since only qualitative or quantitative data is available. Living Labs try to overcome this limitation by combining different research methods in a real life setting (Kusiak, 2007). In that way it is possible to take advantage of the strengths of each methods while compensating for its limitations. This provides a more in-depth insight in the wants and needs of a user and provides a broader contextualization of the user research.

At the moment, there is no clear definition of Living Labs since different competing approaches exist (Almirall, 2008). The concept can cover a wide range of research and methods and both quantitative and qualitative methods can be combined in one research project. Living Labs can be (semi)permanent, but it can also be a more ad hoc constellation. Both incremental and disruptive innovations can be examined, there can be a wide range of actors involved and the goals of the research can be very different. Within a Living Lab, it is possible to examine multiple iterations of a product throughout the different stages of the innovation process (Schaffers et al., 2007). Another important characteristic is that different stakeholders are involved in this process. This connects Living Labs to the 'open innovation' perspective, where innovation is seen as a non-linear and open process with cooperation and collaboration between different stakeholders (Chesbrough, 2004). For a deeper discussion of the roots of the Living Lab-concept and the different types of LL, see Schuurman et al (2011).

In order to enrich theory-building regarding the European vision on Living Labs, Følstad (2008) adopted a bottom-up approach and conducted a wide literature review of ICT Living Labs, identifying nine distinct characteristics. We can construct the following definition: within Living Labs, new ICT-solutions are evaluated by users (1) by experiencing and experimenting in a real-world context (2) and within a familiar usage context (3) for medium- or long-term (4) and on a large scale (5). This allows for research into the usage context (6) with the possible discovery of unexpected ICT-uses and new service opportunities (7), and the technical testing of the innovation in a realistic context (8). During the innovation process, co-creation with the users (9) takes place. While certain authors focus on technical testbeds, Living Labs can be seen as an environment where users can test innovations and provide feedback (Tingan, Zhenyu,

Kimmo, Matti & Yang, 2012). The main goal of a Living Lab in that opinion is to test innovations based on different research methods in a real life setting so that the feedback of the users can be incorporated (Lepik, Krigul & Terk, 2010). This can create a constant feedback loop so that it is possible to refine the innovation. Almirall & Wareham (2009) summarize the three main ideas by which Living Labs are driven: a) involving users as co-creators on equal grounds with the rest of the stakeholders and b) experimentation in real world settings. Based on this we can define Living Labs as a research approach where users are considered as co-partners in the process of innovation and where they can materialize their own needs, aspirations and wishes in their real-life context through active involvement. This is sometimes referred to as the Living Lab-philosophy: to turn users from being traditionally considered as a problem into value creators. This results in an ecosystem approach with all the involved stakeholders (cfr. Infra).

The approach of Pierson & Lievens (2005) illustrates how Living Labs work in practice. They identified 5 stages in a Living Lab research project:

1) contextualization: an exploration of the technological and social implications of the technology or service under investigation. This means a technological scan and state-of-the-art study.

2) selection: identifying potential users or user groups. This can be done on a socio-demographic level, based on selective or criterion sampling or the allowance for theoretical variation of previously defined concepts.

3) concretization: an initial measurement of the selected users on current characteristics, behavior and perceptions regarding the research focus, in order to enable a post-measurement.

4) implementation: the operationally running field test phase of the Living Lab. The research methods in this stage are direct analysis of usage by means of remote data collection techniques (e.g. logging), indirect analysis based on e.g. focus groups, interviews, self-reporting techniques, …

5) feedback: an ex-post-measurement of the users (using the same techniques as the initial measurement) and the formulation of a set of technological recommendations based on the analysis of data gathered during the implementation-phase.

This model shows that the actual ‘testing-phase’ is an important element within a Living Lab-research approach. The pre- and post-measurements of the users stress the ability of Living Lab-research to uncover the ‘added value’ of the innovation and show that the Living Lab-concept is still in line with classical laboratory research, which also works in similar phases.

The main drawback of the Living Lab approach is that it requires a lot of effort of the participants. Creating a community that is used and motivated to provide feedback might overcome this challenge. That is why a panel based Living Lab is scrutinized in this paper. Wu (2012) states that building a community around research can augment the research results, by holding monthly meetings it is possible to increase the commitment. A second advantage of this approach is that it is hard to involve users that are not used to giving feedback (Mulvenna & Martin, 2013). Panels could help overcome this challenge since people know the process and are able to intervene when necessary. In that way a continuous feedback loop can be established in a living lab setting. People that participate

in a lot of research projects can be defined as 'alpha users'. Since they know the research methods and the innovation process, they are able to provide in-depth feedback on the innovation without being experts on every single level. Interesting to note is that the expertise differs between the type of project (for example radio vs online streaming of music). A mix between experienced and new test users seems to be ideal. The 'alpha users' can be combined with panel members that have less experience to create an optimal mix of different types of users. This should result in valuable feedback for the company that is leading the research process. In that way it is also possible to refresh the panel with new users. With panel based living labs it is thus possible to gain deeper insights in the profiles of the users (e.g. lead users, defectors etc.). Next to its theoretical relevance, panels also have a practical value since it is possible to select people from a list. In that way it is possible to speed up the research process.

3 Methodology

There are different types of living labs. Wu (2012) identified three types: (1) government-led partnership-type Living Labs for digital inclusion, (2) university-driven research-type Living Labs, and (3) open network-type Living Labs. It is also possible to classify the Living Labs based on their goals: some labs are region-based, others are sector based while others focus on societal impact (Mulvenna & Martin, 2013). This panel based living lab is mainly an university driven living lab with a clear focus on the media sector. A comparative case study analysis design is used. All four case studies being discussed in this paper were research projects within the Mediatuin ("Media garden") Living Lab[1]. The panel consists out of 7.216 people. This is a panel based living lab with a thematic focus on cross media innovations. This thematic approach gives lead users an opportunity to be involved and increases the commitment of the participants. The recruitment of the panel members consisted of a large intake survey which looks at the respondent's usage and adoption of (new) media technologies. It is important to note that the panel is not representative for the whole population since there is an overrepresentation of young people. Given the Living Lab-panel has a clear thematic focus by which its members are recruited and surveyed this is not an issue. One of the main benefits of such a panel based approach is the ability to make pre-analyses, make segmentations of relevant user profiles and it helps to analyze further research results into a broader context.

In this paper, four innovations that were examined based on this Living Lab methodology are discussed. The first innovation is a new way of listening to music in bars (Jukebox), the second an online radio recording service (Streemr) and the third a crowdfunding platform for music (Sonic Angel). The last innovation is a new media system that gives access to all your content (home server system). The first innovation focuses on providing the user more control over the played music in a public setting. Another option for the music industry is to mix music with additional content. To examine the potential of this approach, a music and radio recording service was proposed. The third service is a crowdfunding platform for promising artists. The last innovation gives access to all your content on all your devices. In all four researches, a multi-method approach was applied with both quantitative and qualitative research methods. The purpose of the researches

[1] http://mediatuin.be/

was multifold: probing for user interest and behavior, their willingness to pay, gather feedback but also technical aspects were tested. The goal was to determine what new services the music industry could develop to remain relevant in the digital age. The goal of each of these Living Labs was to evaluate the innovation. It is also possible to use this methodology earlier in the innovation process (e.g. brainstorming). The five phases of Pierson & Lievens (2005) that were discussed before will be used to analyze the data.

4 Results

The phases will be elaborated by discussing the different cases.

Step 1: contextualization phase: Sonic Angel case

The first step in a Living Lab research is to get a clear view on the environment in which the innovation will be developed. This involves monitoring trends and relevant academic research, investigating the available technologies, gathering relevant expert opinions and a more general user study. For the research on the crowdfunding platform for musicians, Sonic Angel, this meant conducting in-depth interviews with several major stakeholders in the music industry: artists, booking agents, record companies, distributors, radio stations, concert promoters and other relevant stakeholders such as the Belgian society of authors, publishers, composers and publishers, SABAM. These interviews resulted in a solid insight in the current opinions and believes within the music industry itself.

Table 1: A short selection of the most prominent stakeholder opinions.

- *Physical music carriers will continue to exist.*
- *Streaming can be a strong weapon against illegal downloads.*
- *Fanfunding has potential, but needs to become more mainstream to succeed.*
- *No concerns on business models based on consumer data.*
- *Social media became an essential part of the branding and the engagement with fans.*
- *Live performances are becoming ever more important.*
- *Almost everyone is experimenting with experimental models: pay with a tweet, crowdfunding, digital deals, …*
- *DIY is very important. Artists like to do things themselves, as much as possible.*
- *Concerns about the integrity of the artist when the fan gain more influence.*
- *Mixed opinions on illegal downloads. Not everyone considers them as a threat.*

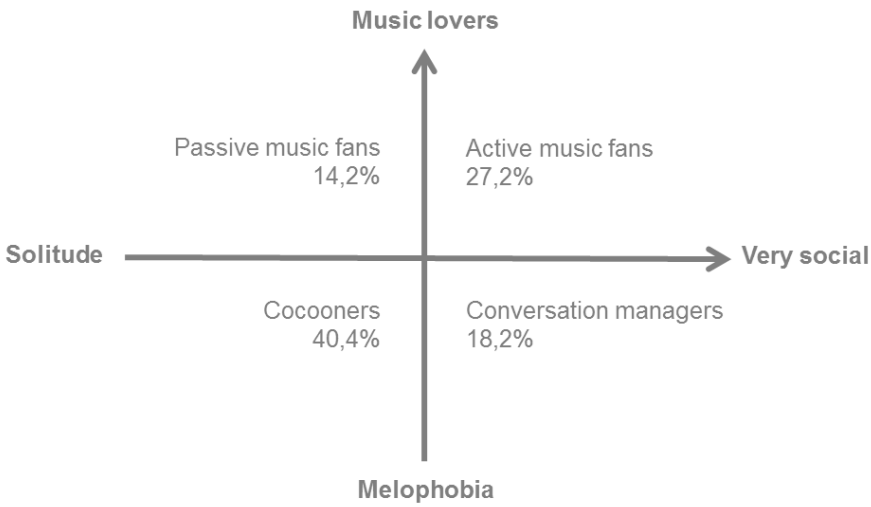
A competitor analysis showed the role of the different actors in the ecosystem. Besides this analysis of the current market situation, a deeper segmentation of the existing living lab panel was made using k-means clustering. This resulted in 5 mayor music consumer profiles: people which didn't care about music at all, people who were only little interested in music and 3 types of highly involved music lovers. The first of these profiles downloads all his music illegally, the second buys all his music on CD's and the third profile pays to stream his music. These profiles lead to the making of persona's which were then validated using qualitative research methods through 3 focus groups and 10 in-depth interviews.

This broader environmental study allowed to match the crowdfunding idea of Sonic Angel with the existing habits and beliefs around music and it was a starting point for the development of a concept which allows live donations through a mobile application to fund the artists' project. This concept was mainly based on the observation that 1) the involvement with the band is the highest on these live moments 2) there is a higher willingness to pay for all profiles when attending a concert 3) there is a strong believe of the industry in crowdfunding models to help young artists. As a final step in this iteration, this concept was then visualized with a demo movie and presented to both the professional stakeholders and the end-users to validate the concept before going to the next phase.

Step 2; Selection phase: Jukebox case

Based on the available data, an initial analysis indicated that certain people could be more interested in the innovations than others. Agglomerative hierarchical clustering was used to determine the amount of clusters, then K means was used to classify the respondents. Different profiles were created based on the available dataset. Based on these profiles, certain users were selected to participate in the subsequent steps. For the Jukebox case 4 clusters were identified. These clusters were constructed based on two main variables: interest in music and frequency of going out (see Figure 1). Based on post hoc tests, it was possible to determine that these clusters differed on a lot of variables (socio-demographics, usage, ownership) so that the clustering is meaningful. One cluster (with people that don't like music and don't often go out) was not taken into account for further analysis. The respondents in the other clusters were invited to participate in a follow up survey that discussed the specific innovation.

Figure 1: Overview of the initial profiles in the Jukebox case.

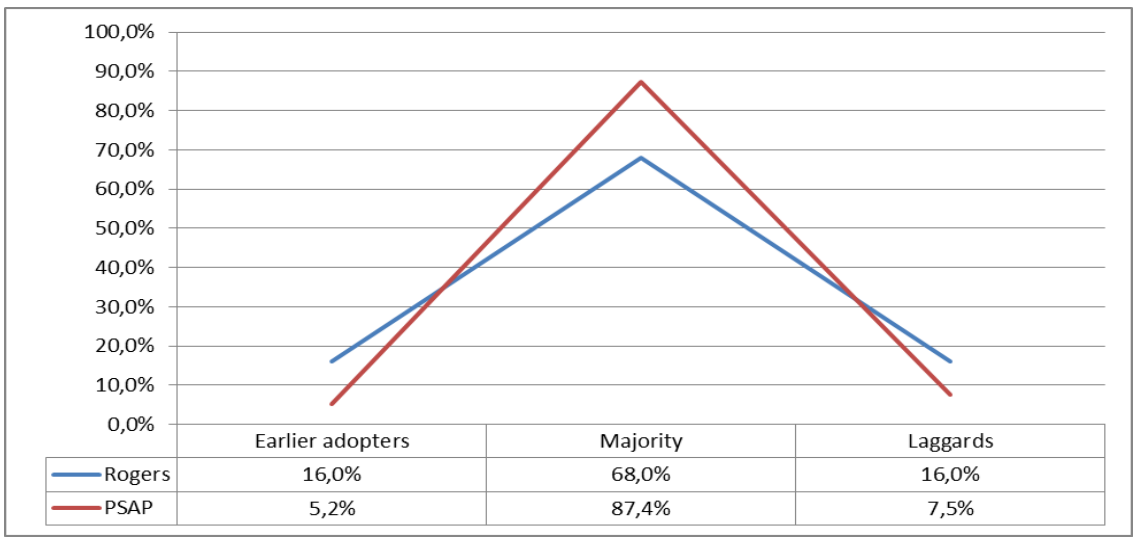


Step 3 Concretization phase: Home server case

These selected profiles received a survey. The first part of the survey examined some general statements. The second part of the questionnaire contained questions probing for their interest in the proposed innovation. In order to assess customer demand, the Product Specific Adoption Potential (PSAP) method was applied to obtain a reliable forecast of market potential. Building further on Rogers' (2003) 'Diffusion of Innovation' theory, this method has been successfully used for and validated for a wide variety of technology products and services (De Marez et al., 2011). According to this theory, the diffusion of an innovation in society follows a bell-shaped pattern amongst five adopter segments: innovators, early adopters, early majority, late majority and laggards. However, traditional intention-based surveys ('Would you be interested in …?') typically overestimate market potential (Bennett and Kottasz, 2001). In contrast, the PSAP method calibrates overestimations of traditional intention surveys to a more reliable level of personal 'optimal' and 'suboptimal' product offerings (including pricing and features) (De Marez and Verleye, 2004).

In the Home server case, of the 2500 selected participants 205 completed the survey. Based on the PSAP curve it was possible to confirm that people that own a lot of devices and consume a lot of meida (the profiles selected based on the panel data) are indeed more interested in this innovation than the other clusters. Note that the first three and the third and fourth category are combined because of confidentially reasons. Figure 2 indicates that only a niche is interested in this system. This can be explained by the high price of the system, a lot of the respondents indicated that this price was too high. Despite this, there is still a lot of interest by the early and late majority.

Figure 2: Market potential of the Home server application



	Earlier adopters	Majority	Laggards
Rogers	16,0%	68,0%	16,0%
PSAP	5,2%	87,4%	7,5%

Step 4: Implementation phase: Streemr case

The next step was to launch the application itself so that the users could use the proposed concept and provide feedback.

The Streemr case indicates that a field test can be very valuable. Next to user insights, this also gave input for the technical configuration of the application. Based on data logs it was possible to monitor the use of this application over time. The rather low amount of user don't guarantee statistical sound conclusions but the earlier adopters tend to be heavier users (measured based on the amount of actions on the platform) (see Table 2). However there were still some laggards that turned out to be heavy users. Since different features were added during the field test, it was possible to get an overview of the most important aspects of the user experience. During the field test the users were able to provide feedback so that a constant feedback loop was in place (cfr. continuous feedback loops). This input was used to improve the product. Next to bug reports, we also received more general input on the UX.

Of the 85 panel members that showed interest to participate in a field trail after the survey (n=252), 34 people actually used Streemr whereas only 26 people used it several times. This indicates that it is necessary to have a large panel to recruit from. A lot of people will churn during the field trial or will not even try the product or service.

Table 2: Analysis based on the log files

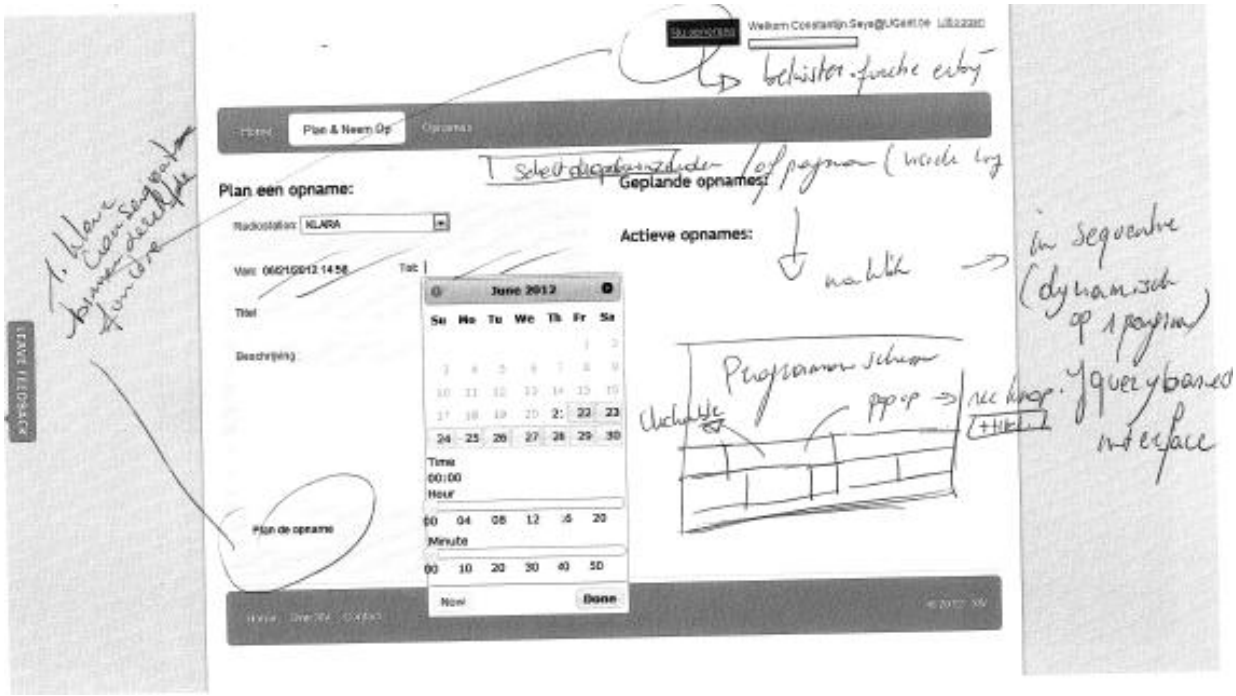
Adoptercategory				
		Earlier adopters	Majority	Laggards
Usage	Light users	0	9	3
	Medium users	4	9	1
	Heavy users	2	4	2

Step 5: Feedback phase: Streemr case

The last step was to organize a co-creation session with a diversified group of test users . Based on this it was possible to refine the innovations. In essence this was a feedback session were the users could comment on the whole user experience.

The goal of this session was to gather feedback on the application and how to improve it. The users were asked to provide feedback on every aspect of the user experience. Next to general remarks, it was also possible to provide more specific information like the preferred user context. Despite that the Streemr application was still in a beta phase, the expectations of the users were quite high since they used record TV shows on their digital TV as a reference framework (see Figure 3).

Figure 3: Feedback from a user during the co-creation session of Streemr.



5 Discussion

The panel based approach has certain advantages and disadvantages:

- Added value of the panel based approach:

- Contextualization phase: this first phase allows the researchers to find out if there is a general interest in the topic based on the results of previous research projects. Furthermore it is possible to select the most interesting user profiles (Schuurman & De Marez, 2012).

- Pre test vs post field trial: During different iterations it is possible to compare how the product or service evolved during the innovation process.

- Community of experienced users that can provide in depth feedback.

- Continuous feedback loops: since the same users are involved in the whole process, it is possible to get feedback during every step.

- Convenience: they are easy to contact since they are involved in the process.

- Flexibility: it is not always necessary to go through all the phases since it is possible that the companies stop in the meanwhile. Panel based LL provide this flexibility since panel members understand the innovation trajectory.

• Limitations of panel based approach:

- Commitment declines fast (cfr. Streemr case).

- Active communication is required to increase commitment.

It is important to note that this is still a relatively new approach so it is still possible to improve several aspects (for example data management) that can improve the results but there remain challenges that have to be taken into account.

6 Conclusion

User-centered design is becoming more important, however traditional methods all have their limitations. A Living Lab approach allows the researchers to combine different methods and adjust their research to the situation. This could help out industries that traditionally struggle to innovate since the user research can happen more efficiently. It is clear that Living Labs have certain advantage over other approaches. The different datasets can be combined, leading to a broad overview of the responses. The Living Lab approach is very flexible so that the research can be adjusted for the specific innovation. Furthermore iterations can be tested during the research project. In the previous sections four case studies about music related innovations were discussed. The combination of data sources provides an in-depth insight about the wants and needs of (potential) users. However this method also has several drawbacks. It requires a lot of involvement from the users. Another drawback is that it takes a lot of time to set up this type of research
By adding the 'panel-centered' approach, an element that was overlooked in most literature on Living Labs, it was possible to overcome some of these limitations. This has a large potential both in terms of sustainability and added value of Living Labs since participants can be involved in different projects. By surveying the total panel with fixed time-intervals, trend studies regarding adoption and usage patterns can be found. Several lessons can be learned from the discussed cases. It is important that the panel is large enough since a lot of participants drop-out. It is necessary to determine how this panel community can be sustained on the longer term. Further research has to clarify what the optimal approach is for Living Labs and to what type of innovations it can be applied.

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[1] http://www.iminds.be/en/develop-test/ilab-o

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